



Precision Strike
Technology Symposium
(PSTS-08)



28 – 30 October 2008
Laurel, MD

Due to the classified nature of this symposium, very few presentations were approved for distribution.

TUESDAY 28 OCTOBER 2008

PERSISTENT SURVEILLANCE SUPPORT TO TARGETING:

- *Adam Timm*—Joint Persistent Surveillance Integration Office, NGA

PRECISION MENSURATION MANAGER:

- *Keith Davis*— Intelligence Analyst/Project Manager, Integrity Applications Incorporated

WEDNESDAY 29 OCTOBER 2008

KEYNOTE ADDRESS—PRECISION STRIKE INTELLIGENCE CAPABILITIES & TECHNOLOGY IMPROVEMENTS:

- *Lieutenant General David A. Deptula*, USAF—Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance

ENHANCED DECISION SUPPORT WITH ADAPTIVE DATA FUSION:

- *Dr. Stanley Young*—Fusion Technologies Consultant, Overwatch Textron Systems

MARITIME HEADQUARTERS WITH MARITIME OPERATIONS CENTERS FORCE APPLICATION—FIRES CAPABILITY AT OPERATIONAL LEVEL OF COMMAND:

- *William Reiske*—Command and Control, JHU/APL

THURSDAY 30 OCTOBER 2008

PANEL—USE OF PRECISION MUNITIONS IN IRREGULAR WARFARE

- *Colonel Eric Smith*, USMC—Director, Fires and Maneuver Division, Marine Corps Combat Development Command

- 0745 **CHECK-IN / CONTINENTAL BREAKFAST** (Sponsored by Kaman Fuzing)
- 0845 **SYMPOSIUM WELCOME:**
Bill Dalecky—Chairman of the Board
- 0850 **JHU / APL WELCOME:**
Dr. Richard T. Roca—Director
- 0900 **US NAVY STRIKE WEAPONS AND VISION:**
Rear Admiral William E. Shannon, III, USN—Program Executive Officer for Unmanned Aviation and Strike Weapons (PEO (U&W))
- 0930 **EMPIRE CHALLENGE:**
Captain Rob Hoppa, USN—Director of Intelligence (J-2), U.S. Joint Forces Command (USJFCOM)
- 1000 **SMALL WEAPONS TECHNOLOGY ROADMAP & RAPID PROTOTYPING FOR ACCELERATED WEAPONS DEPLOYMENT:**
Dr. John Wilcox—ADUSD for Precision Engagement, Office of the DUSD for Advanced Systems & Concepts, Director for Defense Research & Engineering
- 1045 **NETWORKING REFRESHMENT BREAK** (Sponsored by MBDA)
- 1115 **TECHNOLOGY TO ENHANCE THE ENTIRE TARGETING CYCLE:**
Colonel Eric Thomson, USAF—Deputy Director for Targeting Support, Directorate for Intelligence, The Joint Staff (J2/J2T)
- 1200 **DEVELOPMENTS IN ELECTRONIC ATTACK—INCREASING PRECISION AND CAPACITY** (ABSTRACT):
Captain Steve Kochman, USN—PMA-234, Naval Air Systems Command
- 1230 **LUNCHEON**—Kossiakoff Center Dining Room (Sponsored by Orbital Sciences)
- 1300 **LUNCHEON ADDRESS—END GAME FOR GLOBAL WAR ON TERROR:**
Lieutenant General Thomas G. McInerney, USAF (Ret)—Fox News Military Analyst
- 1345 **PROMPT GLOBAL STRIKE (PGS) CAPABILITIES:**
Greg Hulcher—Deputy Director, Strategic Warfare, OUSD (Acquisition, Technology and Logistics)
- 1430 **PERSISTENT SURVEILLANCE SUPPORT TO TARGETING** (ABSTRACT):
Adam Timm—Joint Persistent Surveillance Integration Office, NGA
- 1500 **NETWORKING REFRESHMENT BREAK** (Sponsored by MBDA)
- 1530 **PRECISION MENSURATION MANAGER** (ABSTRACT):
Keith Davis—Intelligence Analyst/Project Manager, Integrity Applications Incorporated
- 1600 **AARGM—A LETHAL ADDITION TO PRECISION STRIKE FOR DESTRUCTION OF ENEMY AIR DEFENSES** (ABSTRACT):
Commander Patrick W. Smith, USN—PEO(U/W), PMA-242
Douglas M. Larratt—Manager, Strike Weapons Business Development, ATK Advanced Weapons
- ALT **GEOREGISTERED IMAGERY ON A UAV SERVER FOR PRECISION STRIKE IN AN URBAN ENVIRONMENT** (ALTERNATE ABSTRACT):
Dr. Alison K. Brown—President & CEO of NAVSYS Corporation
- 1630 **EVENING RECEPTION WITH HEAVY HORS D'OEUVRES**
(Sponsored by Raytheon Company)

(All PSTS-08 participants are invited and encouraged to attend)



Dr. Richard T. Roca
Director, Johns Hopkins
University Applied
Physics Laboratory



Greg Hulcher
Deputy Director, Strategic
Warfare, OUSD (Acquisition,
Technology and Logistics)

PSTS-08 is being conducted at the SECRET/NOFORN level -- no notetaking is permitted

AGENDA

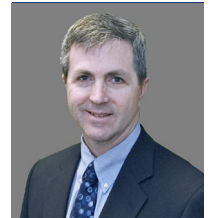
WEDNESDAY, 29 OCTOBER

Precision Strike Technology Symposium (PSTS-08)

- 0645 **CHECK-IN / CONTINENTAL BREAKFAST** (Sponsored by Northrop Grumman)
- 0730 **MANAGING THE KILL CHAIN—IS DYNAMIC C2 THE MISSING LINK** (ABSTRACT):
Colonel Steven J. Walker, USAF—Joint Command & Control for Net-Enabled Weapons (JC2NEW) Joint Test Director, Eglin AFB
- 0800 **FALCON EYE MARITIME INTERDICTION SEEKER** (ABSTRACT):
Jeffery A. Lyon—Falcon Eye Lead Systems Engineer, Mustang Technology Group
- 0830 **KEYNOTE ADDRESS—PRECISION STRIKE INTELLIGENCE CAPABILITIES & TECHNOLOGY IMPROVEMENTS:**
Lieutenant General David A. Deptula, USAF—Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance
- 0915 **REFRESHMENT BREAK** (Sponsored by Honeywell Int'l)
- 0930 **ENHANCED DECISION SUPPORT WITH ADAPTIVE DATA FUSION** (ABSTRACT):
Dr. Stanley Young—Fusion Technologies Consultant, Overwatch Textron Systems
- 1000 **B-52 CAPABILITIES UPDATE & LONG RANGE STRIKE:**
Colonel E. West Anderson, USAF—Vice Commander, 2d Bomb Wing
- 1100 **IED SITUATION & USE OF ROBOTIC SYSTEMS:**
Colonel Karl Reinhard, USA—Executive Officer to the Director, Joint IED Defeat Organization
- 1145 **THE IRAQI PERSPECTIVES PROJECT UPDATE:**
Kevin Woods—Joint Advanced Warfighting Program, Institute for Defense Analyses
- 1230 **LUNCHEON**—Kossiakoff Center Dining Room (Sponsored by The Boeing Company)
- 1315 **PSA SPECIAL AWARD CEREMONY TO HONOR SATELLITE SHOOTDOWN TEAM**
- 1400 **THE FUTURE OF HARD TARGET DEFEAT:**
Jeffrey A. Thomas—Chief, Test Support Division, Defense Threat Reduction Agency
- 1445 **DEFEATING WMD IN HARD & DEEPLY BURIED TARGETS (HDBTs)** (ABSTRACT):
Dr. Robert L. Hastie Jr.—Chief, Hard Target Defeat Branch, DTRA
- 1515 **NETWORKING REFRESHMENT BREAK** (Sponsored by Honeywell Int'l)
- 1545 **COUNTERMEASURES ASSESSMENTS OF PRECISION GUIDED WEAPONS:**
Donald F. Walker—Principal Analyst EO Team, Center for Countermeasures, Operational Test & Evaluation, OSD, White Sands Missile Range
- 1615 **MARITIME HEADQUARTERS WITH MARITIME OPERATIONS CENTERS FORCE APPLICATION—FIRES CAPABILITY AT OPERATIONAL LEVEL OF COMMAND** (ABSTRACT):
William Reiske—Command and Control, JHU/APL
- ALT **DECISION SUPPORT USING LONG-TERM STORAGE OF TACTICAL & ISR DATA** (ALTERNATE ABSTRACT):
Tony S. Jacobs—Director of Engineering, Factor(e) Corporation
- ALT **DEFINING COMMON DIGITAL INFORMATION EXCHANGE REQUIREMENTS FOR COMBINED CALLS-FOR-FIRE & CLOSE-AIR-SUPPORT MISSIONS** (ALTERNATE ABSTRACT):
Bryan E. Herdlick—Global Engagement Systems Engineer, JHU/APL
- 1645 **ADJOURN FOR THE DAY**



Colonel West Anderson, USAF
Vice Commander, 2d Bomb Wing



Kevin Woods
Joint Advanced Warfighting Program,
Institute for Defense Analyses

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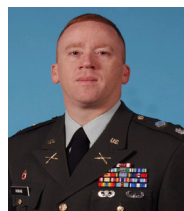
- 0645 **CHECK-IN / CONTINENTAL BREAKFAST** (Sponsored by ATK)
- 0730 **SPECIAL REMARKS—NATIONAL SECURITY OBJECTIVES:**
Dr. Michael E. Vlahos—Fellow, National Security Studies, JHU/APL
- 0800 **NON-KINETIC COUNTER ELECTRONIC STRIKE** (ABSTRACT):
Ronald Flatley—Program Manager, Directed Energy Technology Office, Naval Surface Warfare Center, Dahlgren VA
- 0830 **TOMAHAWK MARITIME INTERDICTION CAPABILITY** (ABSTRACT):
Walter E. Bowen—Assistant Group Supervisor, JHU/APL
- 0900 **MQ-9 REAPER UNMANNED AERIAL VEHICLE:**
Colonel Jeffrey Eggers, USAF—USAF Intelligence, Surveillance & Reconnaissance (ISR)—Unmanned (A2)
Colonel James R. Gear, USAF—Director of Operations, Headquarters Air Force, Unmanned Aircraft Systems Task Force
- 0930 **PENETRATING ISR/STRIKE FROM THE AIRCRAFT CARRIER OF THE FUTURE** (ABSTRACT):
Captain Martin W. Deppe, USN—PM, Navy Unmanned Combat Air System, PMA-268
- 1000 **REFRESHMENT BREAK**
- 1015 **OPPORTUNITIES IN PRECISION—RELIABLE GUN-FIRED MUNITIONS:**
William R. Smith—Director, Fuze & Precision Armaments Technology, US Army ARDEC, Picatinny NJ
- 1100 **JOINT SURFACE WARFARE JCTD—MORE THAN WAR AT SEA** (ABSTRACT):
Robert K. Finlayson III—Technical Director for Joint Surface Warfare, JHU/APL
- 1130 **PANEL—USE OF PRECISION MUNITIONS IN IRREGULAR WARFARE:**
Moderator: *Lieutenant Colonel Joe Horab, USA*—Chief, Kinetic Weapons Branch, Force Application Engagement Division (J-8), The Joint Staff
- *Colonel David Sutherland, USA*—Chief, Iran & Levant Region Middle East (J-5), The Joint Staff
 - *Captain Daniel Dixon, USN*—Military Assistant to DDR&E, OUSD (AT&L) (Former Commander, Carrier Air Wing EIGHT)
 - *Colonel Eric Smith, USMC*—Director, Fires and Maneuver Division, Marine Corps Combat Development Command
 - *Colonel Art McGettrick, USAF*—Chief, Force Application Engagement Division (J-8), The Joint Staff
- Note:** All Panelists are warfighters who recently returned from Afghanistan and Iraq
- 1300 **CLOSING REMARKS:**
Ginny Sniegon—Programs Chair, PSA Board of Directors
- 1305 **BUFFET NETWORKING LUNCH**—Kossiakoff Center Dining Room (Sponsored by Lockheed Martin)
(Joint Staff Warfighters informal interaction with Government & Industry Representatives)
***All PSTS-08 participants are invited and encouraged to attend



Colonel Jeffrey Eggers, USAF—USAF Intelligence, Surveillance & Reconnaissance (ISR)—Unmanned (A2)



William R. Smith—Director, Fuze & Precision Armaments Technology, US Army ARDEC, Picatinny



LTC Joe Horab, USA—Chief, Kinetic Weapons Branch, Force Application Engagement Division (J-8), The Joint Staff



Dr. Michael Vlahos
Fellow—National Security Studies
National Security Analysis Department

PSTS-08 COMMITTEE

PSA Programs Chair: Ginny Sniegon **PSA Programs Vice-Chair:** CAPT Gregg "Mongo" Sears, USN

PSTS-08 Tri-Chairs: Dr. John Walter, George McVeigh, Harvey Dahljelm

Warfighter Representatives:

CAPT Larry Burt USN, Col Bill DeMaso USAF, COL Lance Moore USA (Ret), Col Bob Valin USAF,
LTC Joe Horab USA, LCDR Scott Wilson USN, LtCol Chuck Kelly USMC (Ret), LTC Ken Britt USA (Ret)

PSTS-08 Technical Chairs:

CAPT Mongo Sears, USN— OUSD/AT&L Deputy Executive Officer for Naval Aviation and Tactical Systems

KC Albright— Manager, Strike Systems, Whitney, Bradley & Brown, Inc.

Buck Buchanan—Director for Business Development, Raytheon Solipsys, Fulton, MD

Suzy Kennedy— Program Area Manager, Kinetic Engagement Program Area, JHU/APL

PSA Executive Director: Dawn Campbell



Precision Mensuration Manager (PMM)

*Presenter: Keith Davis
Integrity Applications Incorporated*

*Danny Searle & Barry O'Neal
NAVAIR Weapons Engagement Office*

*Ken Abeloe
Integrity Applications Incorporated*



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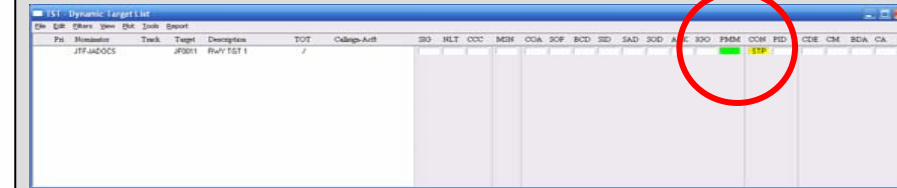
PMM



Project Overview

Operational Statement: The Precision Mensuration Manager (PMM) automates and distributes aimpoint generation tasking through database integration and agent technologies.

JADOCs





PMM



Program Details

- PMM server integrates directly with the Joint Automated Deep Operations Coordination System (JADOCS) to provide the combatant commander's targets of interest to the targeting group
- If these targets are designated for precision coordinate generation, PMM sends the request to a precision targeting manager
- Precision targeting manager who either assigns the target for further processing or rejects the target for aimpoint generation



PMM



Program Details Continued

- Targeting manager is allowed to assign the target of interest to any available analyst
 - Analysts are automatically notified of any incoming aimpoint requests
 - Analysts have immediate access to the target's description, latest tactical image, context map, and potential image solutions for mensurating the geo-coordinates
 - Cursor on Target (CoT) XML message is sent to initiate the Common Geopositioning Services (CGS) workstation's CoT workflow



PMM



Program Details Continued

- When working within a time sensitive environment, PMM sets expiration times on targets of interest while also prioritizing high value targets automatically
 - Regardless of priority, a time stamp is applied to each step of the process; when an aimpoint request is received, assigned or rejected, accepted by the analyst, completed by the analyst, and approved by the manager
- After a targeteer completes an aimpoint, a CoT message is back to the target manager for review and approval

- Once approved, the JADOCS clients are updated with the mensurated coordinates (geo-coordinate, error) and the JADOCS target manager receives notification

The screenshot shows a software window titled "TST - Dynamic Target List". It features a menu bar with options: File, Edit, Filters, View, Plot, Tools, and Report. Below the menu is a table with columns: Pri, Nominator, Track, Target, Description, TOT, Callsign-Acft, SIG, NLT, CCC, MSN, COA, SOF, BCD, SID, SAD, SOD, ATK, ISO, PMM, CON, PID, CDE, CM, BDA, CA.

Pri	Nominator	Track	Target	Description	TOT	Callsign-Acft	SIG	NLT	CCC	MSN	COA	SOF	BCD	SID	SAD	SOD	ATK	ISO	PMM	CON	PID	CDE	CM	BDA	CA
	JTFJADOCS		JF0011	RWY TGT 1	/														[Green Box]	[Yellow Box]					

A red circle highlights the "ISO" column header and its corresponding green box in the first data row. The "CON" column has a yellow box containing the text "IST".



PMM



Conclusions

- Eliminates a key bottleneck in the time critical targeting process by coordinating and distributing the power of multiple targeteers working synergistically against a common threat
- Bridges a communication gap between operators and the intelligence specialists supporting them
- A viable solution for distributed and coordinated targeting within the time-sensitive environment

Headquarters U.S. Air Force

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ISR - Precision Strike Capabilities & Technology Improvements



Lt Gen David Deptula
Deputy Chief of Staff for Intelligence,
Surveillance, and Reconnaissance

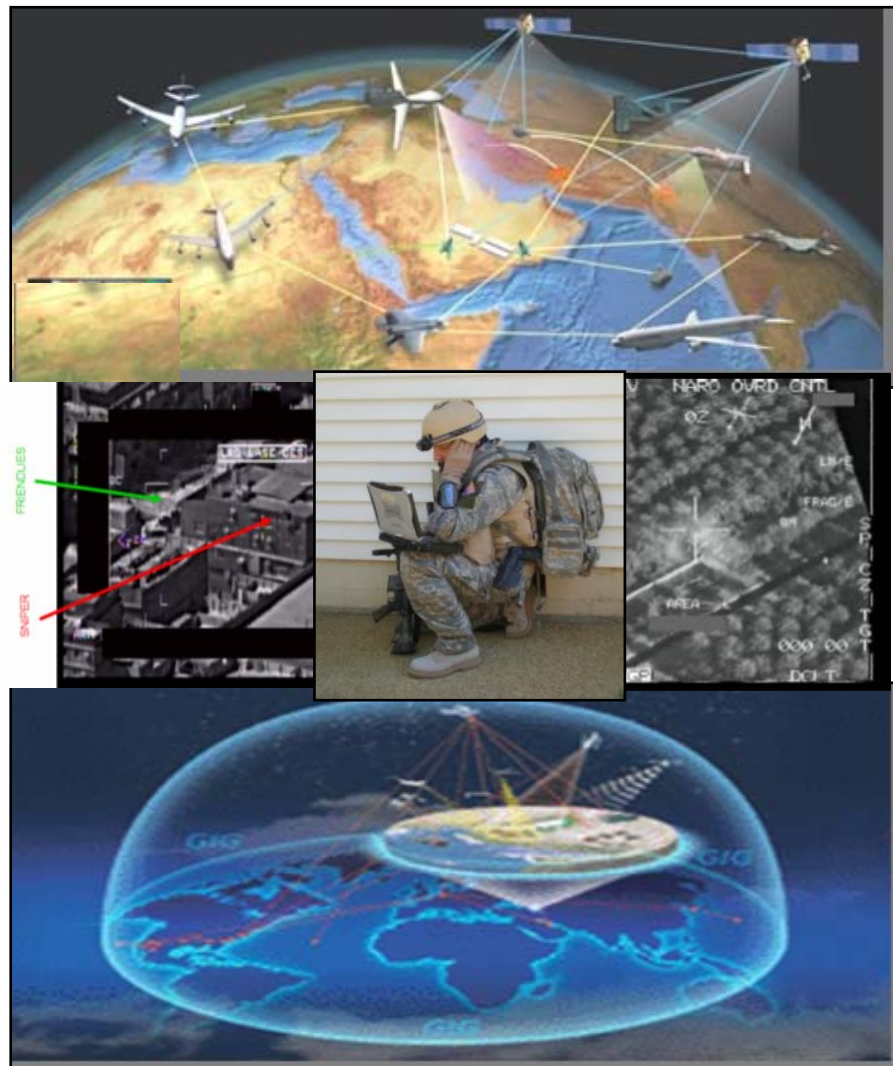
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Introduction

- 20th Century Warfare ...
- 21st Century Challenges ...
- Tenets of Information Age Warfare ...
- Information Age Warfare ISR ...
- What we need from you ...



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20th Century Warfare

A cultural divide of precision and information



WWI: Recon
Balloon

WWII: Lockheed "Recce" P-38



Vietnam: RF-101 Voodoo



Vietnam: RF-4C

Korea: N. American RB-45J



Cold War: SR-71



Cold War: Space



Today: GLOBAL HAWK



Today: REAPER

Finding, Fixing Tracking ...

Targeting, Engaging , Assessing...

WWI : Verdun, FR



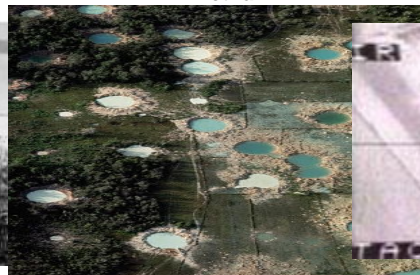
WWII : Berlin, GE



Korea: Seoul



Vietnam



Desert Storm



Iraqi Freedom: Zargawi



Today's challenges demand a new approach....

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Traditional Challenges: US dominance no longer assured...

Near-term

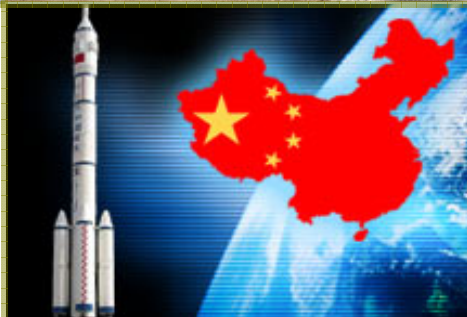
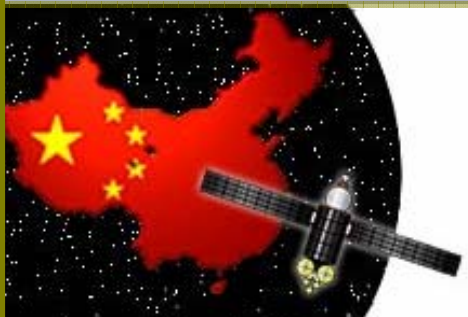
Mid-term

Long-term

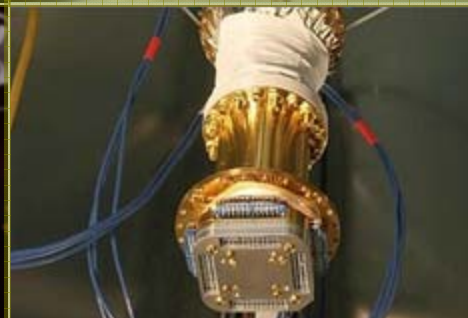
AIR



SPACE



CYBER



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Non-Traditional Challenges: ***US increasingly 'surprised'...***

Irregular

Catastrophic

***Disruptive
Technology***



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Emerging Technology:

Diffusion – technology no longer ‘asymmetric’

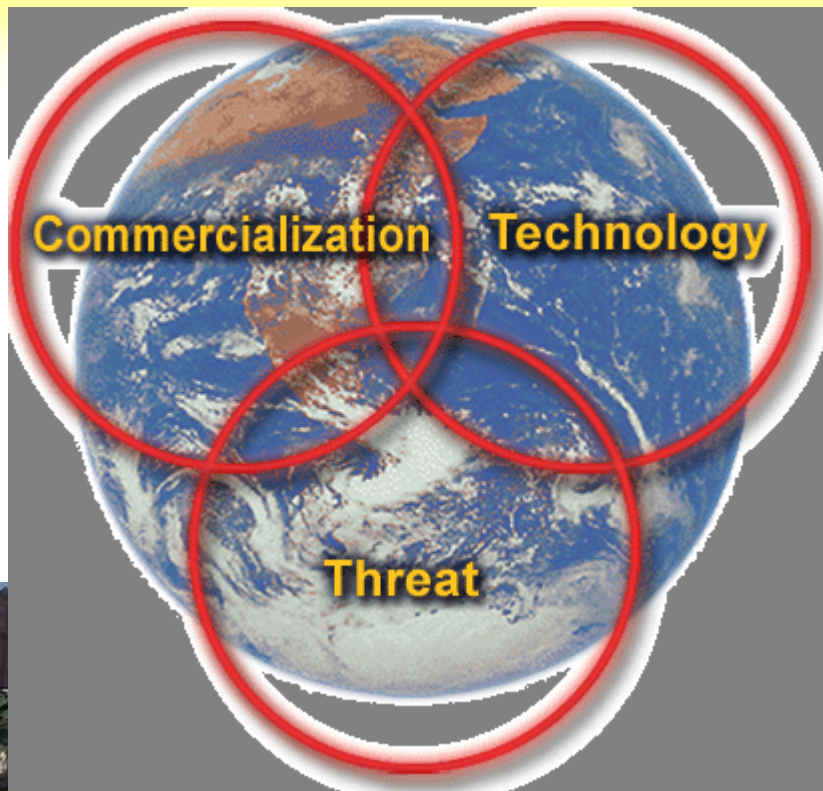
Globalization and commercialization of technology resulting in potential disruptive threats worldwide



GPS Jammers



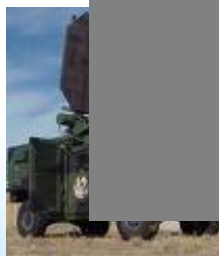
Anti-missile Defense



Laser



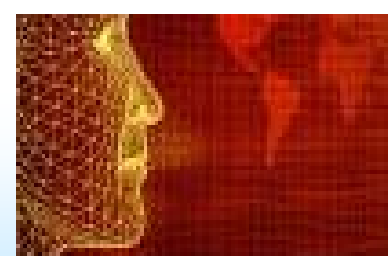
Satellites



Energy Directed



Cyber



Biometrics/Nano

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21st Century Challenge

Precision and Information Synergy



INDUSTRIAL AGE
WARFARE

INFORMATION AGE
WARFARE



“The most important tactical skill Airman will need in the 21st Century will be the ability to rapidly acquire, develop, and share information across the Joint Force, and at all levels of warfare”

Lt Gen David A. Deptula, DCS/ISR

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21st Century Challenge

Precision and Information Synergy

INFORMATION Age Warfare: Find/Fix is the biggest challenge...



ISR is the “hub” of the 21st Century Kill Chain....

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Info Age Warfare Tenets:

Viewing ISR as indivisible...

- Historically...
 - Surveillance & Reconnaissance \neq Intel
- Today's Information Age:
 - Surveillance & Reconnaissance are the inputs to the production of Intel, *and vice versa ...*
- “Flashy” technologies like UAS's & FMV add confusion
 - We forget how much integrated all-source, all-domain intelligence went into synchronizing that surveillance or reconnaissance capability at the right place at the right time to begin with ...



**Information age warfare demands that ISR
be indivisible...**



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Info Age Warfare Tenets:

Viewing ISR as Operations...

- Info age demands an effects-based approach
 - Kill chain is now ISR dependent
 - Single platforms executing entire kill chain



Today, ISR is operations...



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Info Age Warfare Tenets:

Seeing ISR as “Multi-domain-ational”...

- ISR operates in ALL domains...
 - Land, Sea, Air, Space, Cyberspace
- ISR impacts all other mission areas:
 - Counter - Land, Sea, Air, Space, Cyberspace
- To be truly efficient, ISR demands integration of all domain feeds...
- Stovepiping ISR by domain or platform “ownership” produces needless duplication, rivalry; synchronization problems



Ultimately, decision makers care about the so what of intelligence;
the where or who of collection is of little consequence



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Info Age Warfare Tenets:

ISR is about Capabilities & Effects...

- **AF is transforming ISR with a capabilities and effects based approach**
 - **ISR enterprise need not necessarily involve only “intel” coded Airman to be intelligence**
 - **Example: Targeting pods use for ISR taskings**
- **A platform-based construct misses the opportunity to integrate, analyze and interpret information of value to warfighters/decision makers**



**Making every sensor a shooter, and every shooter a sensor produces the capability, effects, and flexibility
Info-age Warfare demands ...**



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Precision & Information Synergy: F2T2EA of Zarqawi

The Strike On Zarqawi

Abu Musab al-Zarqawi, the leader of Al Qaeda in Iraq, was killed in an American air strike on a safe house near the town Hibhib.



Images of the strike from the Defense Department



- 1 Coalition forces tracking Sheikh Al Rahman, a spiritual adviser to Mr. Zarqawi, determine that Rahman is going to meet him at 6:15 p.m. Wednesday at an isolated house north of Hibhib.
- 2 Two F-16 jets are dispatched. The house is struck with two 500-pound bombs.
- 3 Iraqi police arrive at the house first, followed by American troopers from the 4th Infantry Division.
- 4 The soldiers find six victims of the blast: Zarqawi, Rahman, two other men, a woman and a child.
- 5 Within a few hours of initially identifying Zarqawi, American and Iraqi forces conduct 17 raids in and around Baghdad, yielding what officials call a "treasure trove" of intelligence.
- 6 At 3:30 a.m. Thursday morning, Zarqawi is positively identified using his fingerprints.

The New York Times; satellite image from DigitalGlobe via Google Earth



2006 Planning Meeting



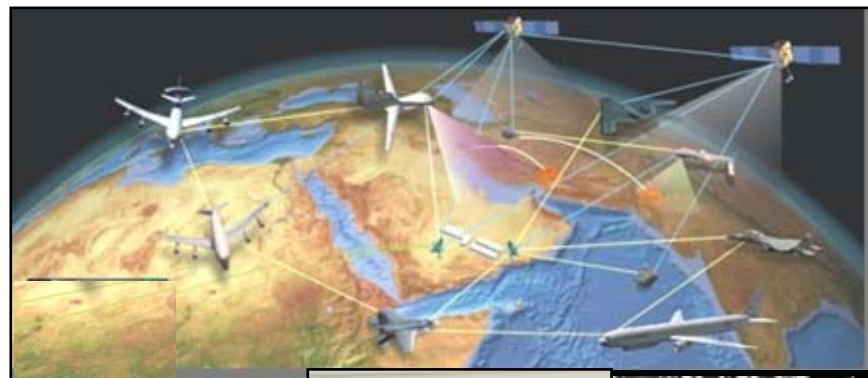
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Information Age Warfare ISR: *What We Need From You ...*

- 5th Generation Threat Counters...
- Precision Targeting ...
- Information Fusion ...



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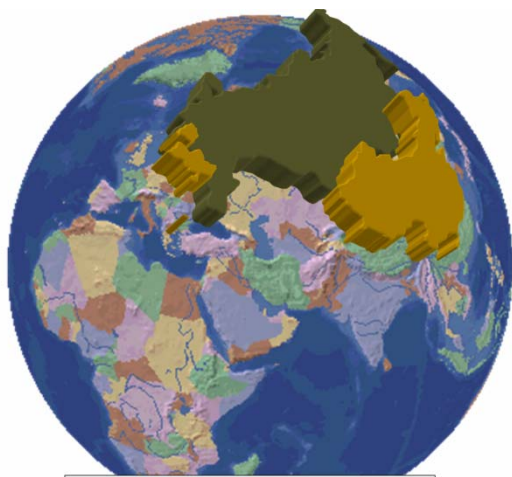


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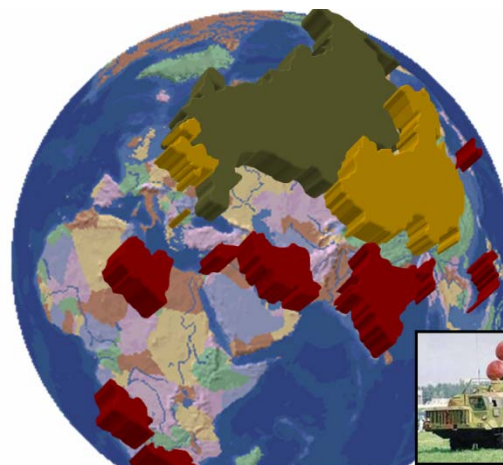
5th Generation Threat Counters

Anti-access/Area-denial “access”

- Advances in AA/AD technology are spreading ...
- Increasingly to areas of the world we need to gain ISR “access” too ...
- Range, reach, endurance, survivability, low observability must be present at the start of ISR systems concepts..not “add ons” after the sensor is proven ...



Advanced Air-to-Air Systems



Advanced Surface-to-Air Systems

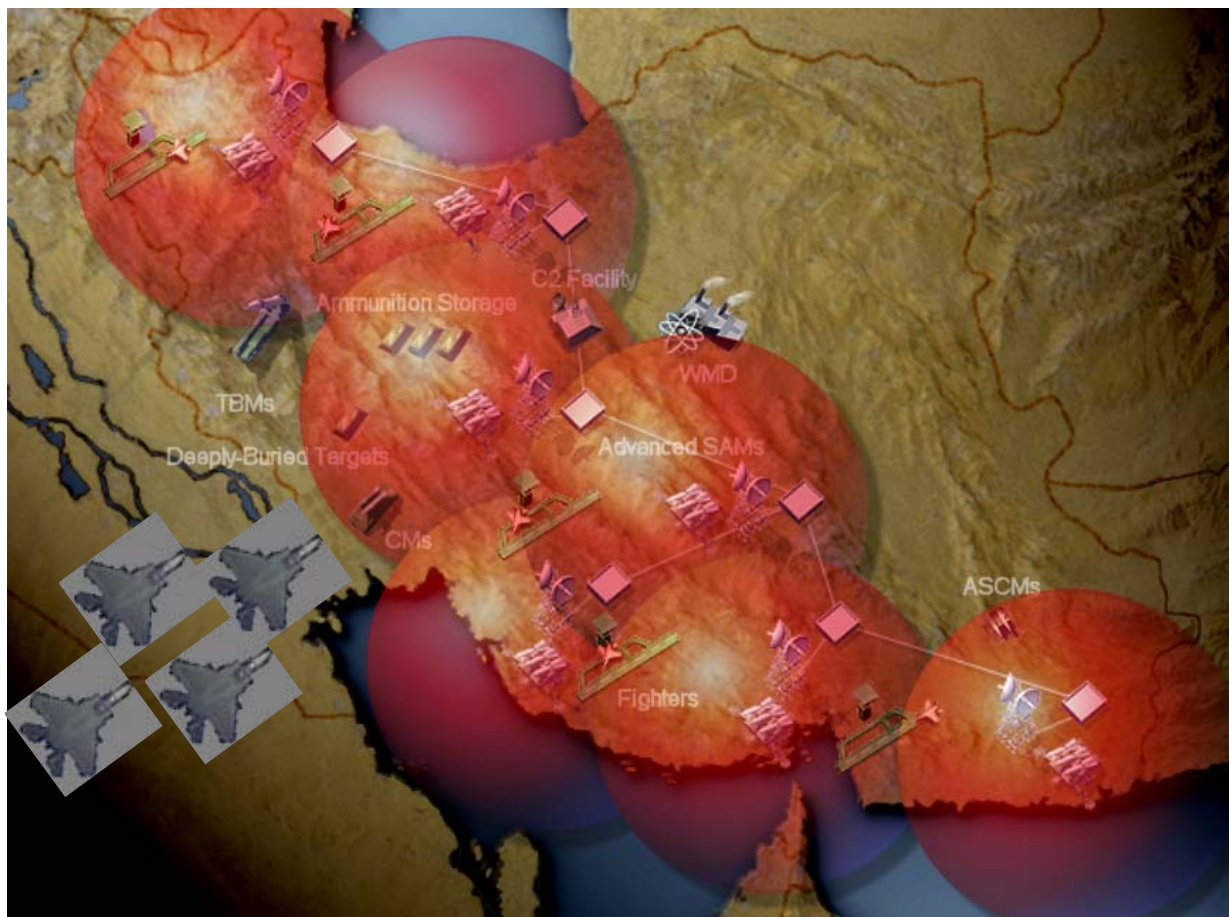




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5th Generation Threat Counters:

Stand-off sensors



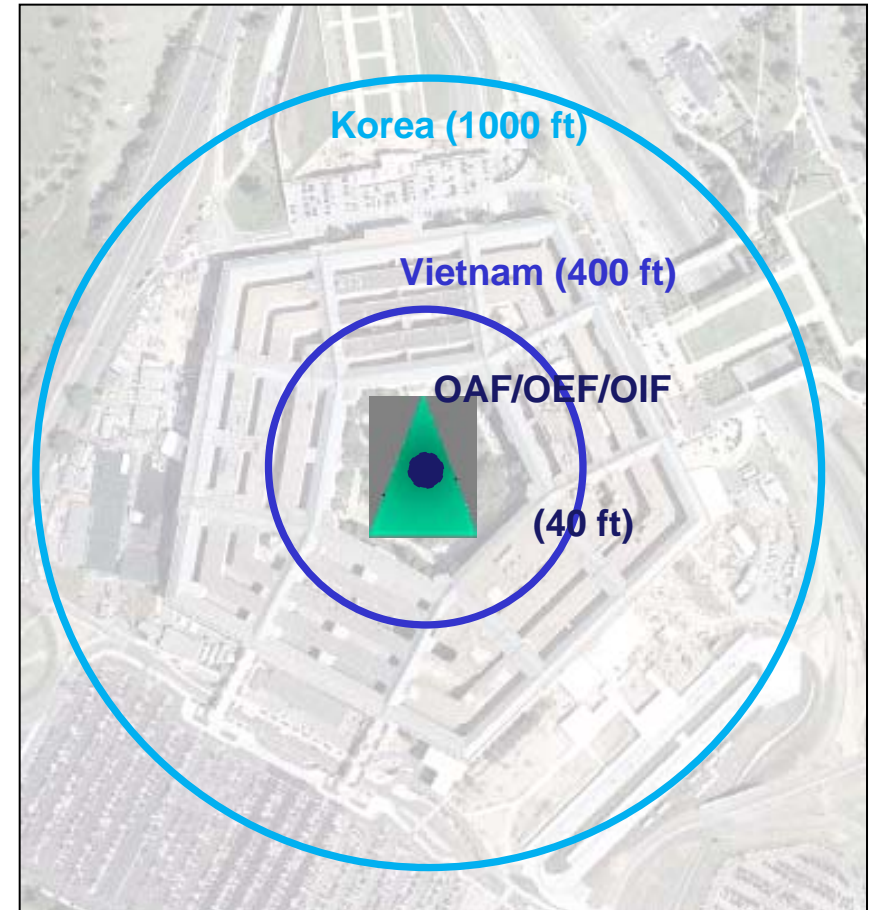
Stand-off sensors for ISR capabilities in denied areas



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Precision Targeting: Target Mensuration

- Precision weapons are no good without precision coordinates
- Expect 212,000 GPS / INS guided weapons by 2015
- Can take 20-minutes to 3+ hours to mensurate each point
- What ISR needs:
 - Automated point mensuration capabilities / systems



MK 84 class bomb, Med Alt



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Precision Targeting: ***Highly Mobile Targets***

- **Desert Storm “Scud Hunt” demonstrated the difficulties**
- **Future moving away from fixed to mobile targets**
- **What ISR needs:**
 - **Time-sensitive, time-critical, responsive flexibility ...**
 - **Automatic sensor integration ...**
 - **Automatic data base/pattern of life “tip offs” ...**



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Precision Targeting: ***Hardened and Deeply Buried Targets***

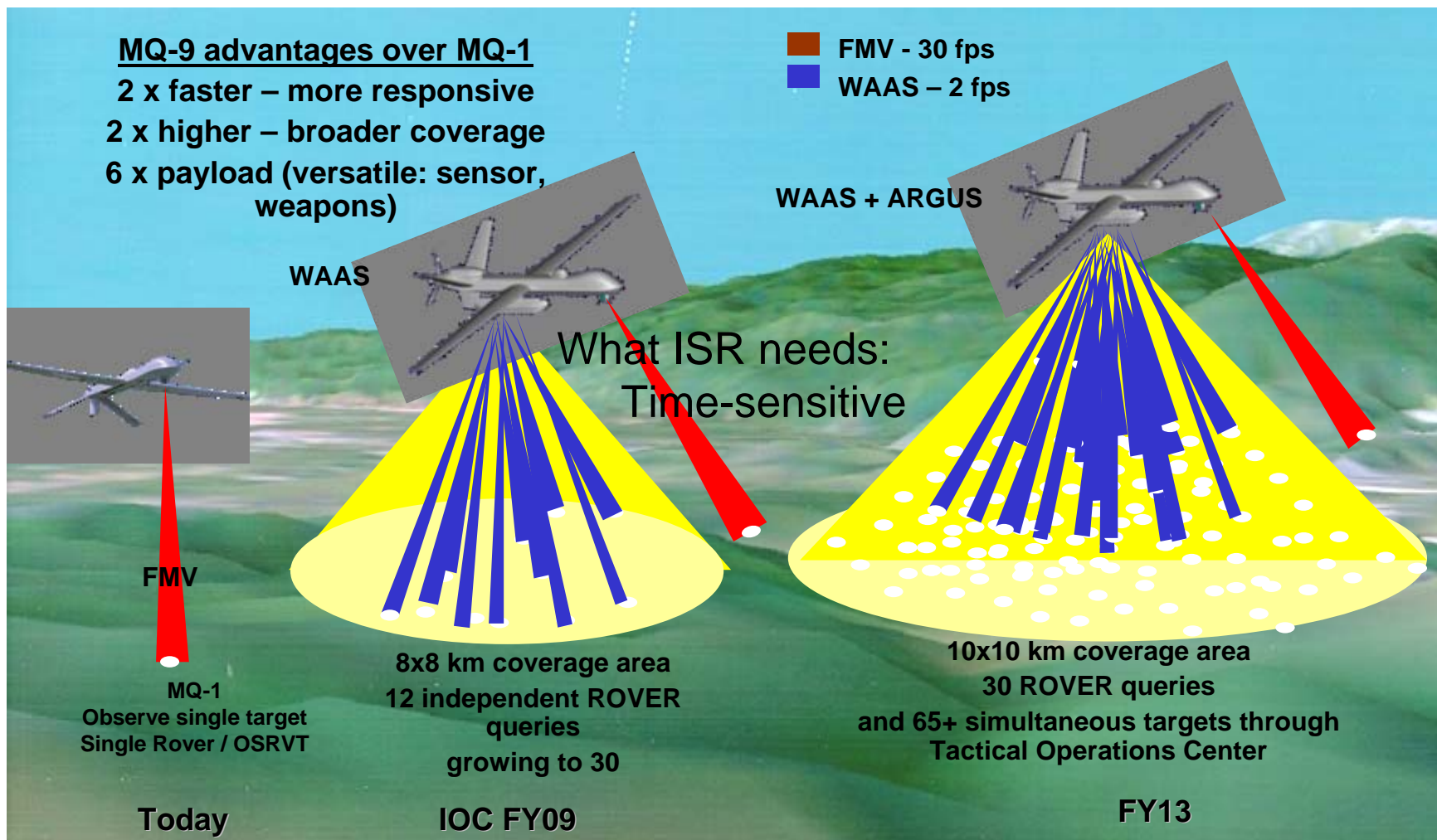
- **Assess Hard and Deeply Buried Target effects ...**
 - **Even if weapons penetrate, may be difficult to cause substantial damage due to internal design**
- **Often used for WMD-related technologies**
 - **Counter WMD without collateral damage...**
- **How will we know it was destroyed ?**





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Information Fusion: Wide Area Airborne Surveillance

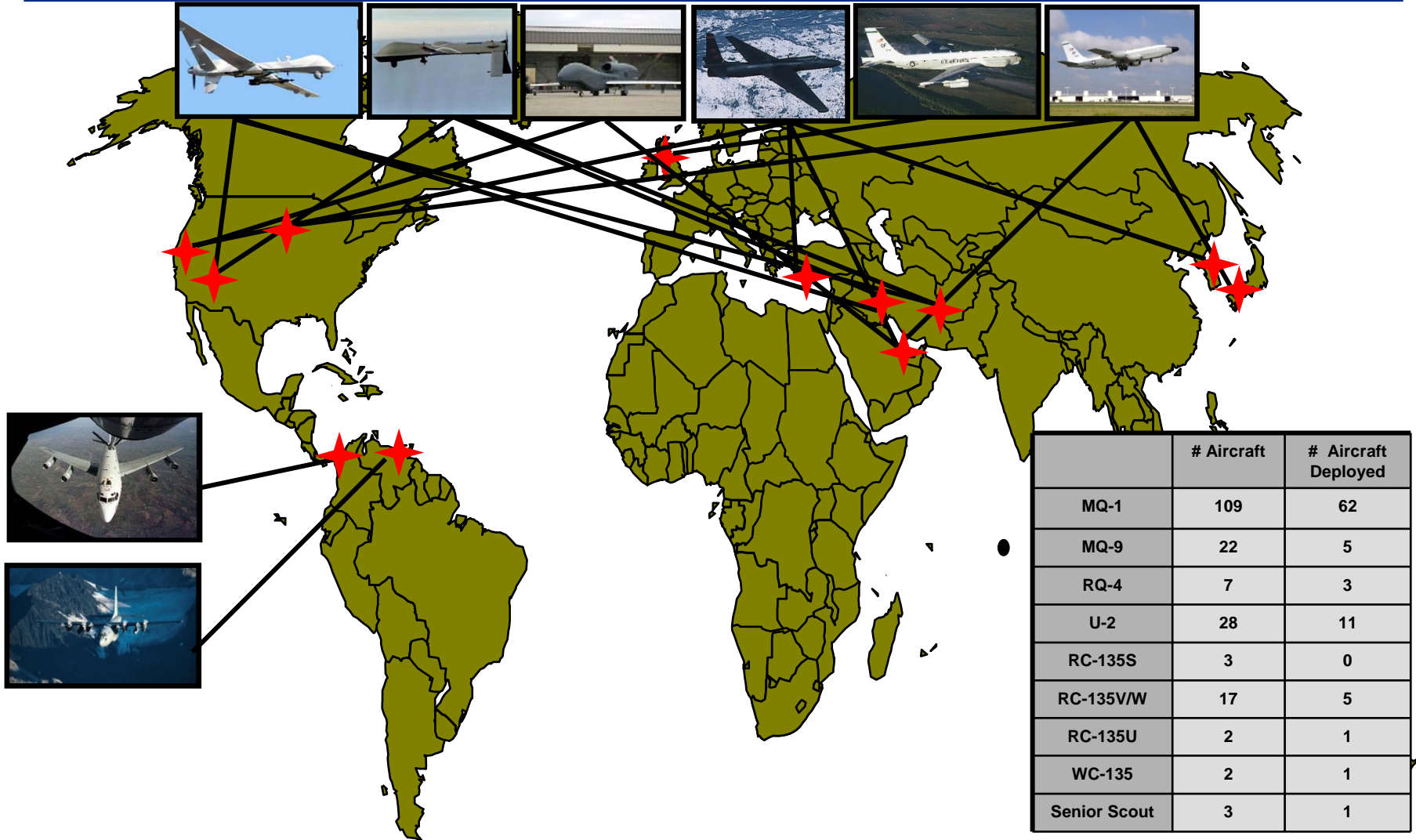


How do we handle the upcoming tsunami of data?



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Information Fusion: Instantaneous dissemination



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End State: Optimized Kill Chain



Sensor-Shooter integration: We must integrate all ISR data in moments, not minutes or hours

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Take Aways ...

- **Need your help to solve 21st Century ISR - Precision Strike challenges...**
- **Must view ISR as:**
 - **Indivisible**
 - **Operations**
 - **“Multi-domain-anotional”**
 - **Capabilities and Effects**
- **Must solve the problems of:**
 - **ISR vs. 5th Generation Threats**
 - **Precision Targeting**
 - **Information Fusion**



Fly – Fight – Win



...Questions?



The Human Dimension in Precision Fires

Colonel Eric Smith
USMC

THE PLAN

- Less than 20 minutes from me.
 - Ask question at any time.
- I don't presume to know what you want to hear about, so please tell me.
- I am not an expert on PGMs or their use, but I have used them ---and chosen not to.



1 4 2005
14:21:58

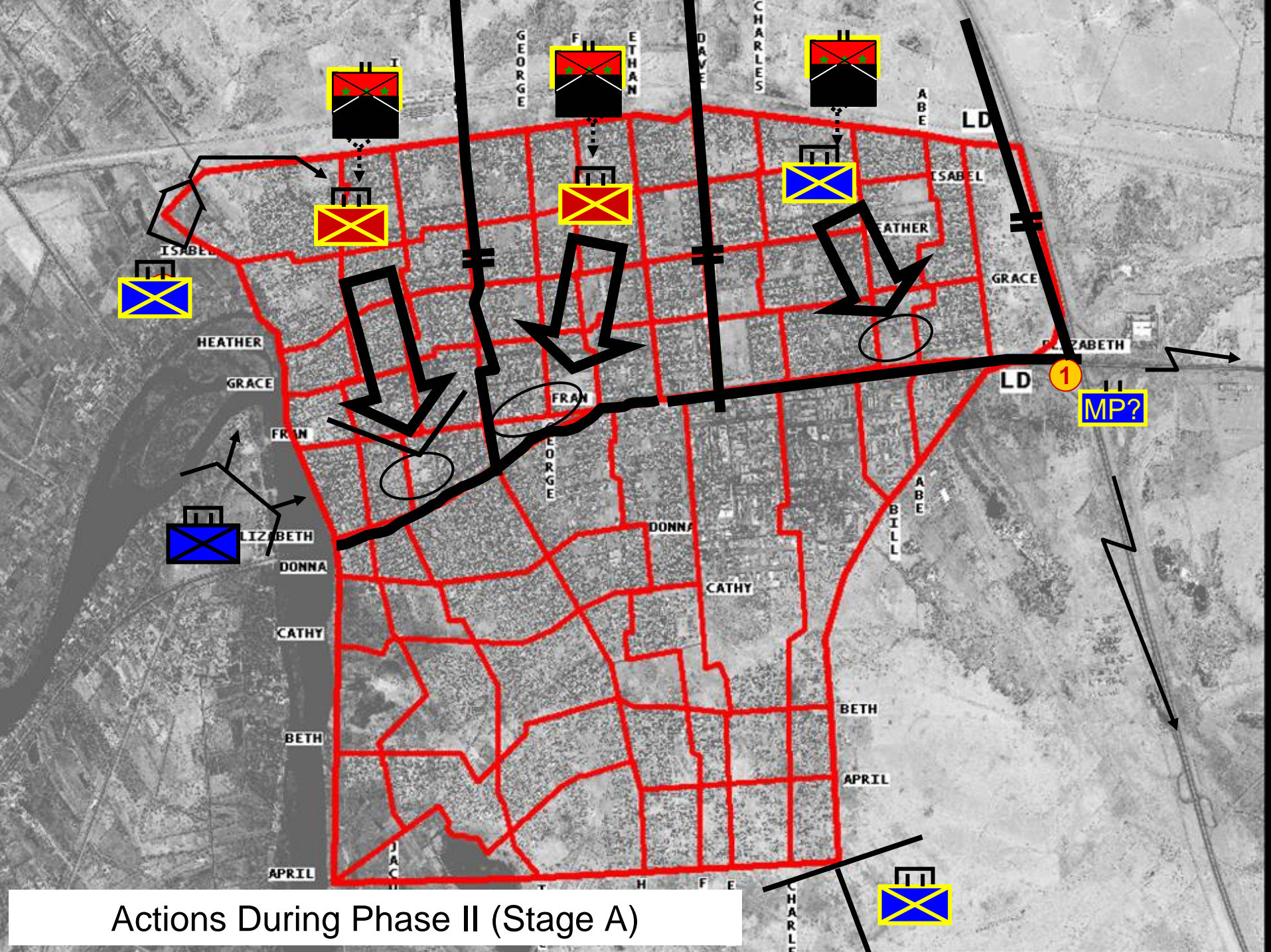
TWO DISTINCT FIGHTS

FALLUJAH

- RCT X.O.
- Sparsely populated areas, but still significant civilian pop.
- Ability to employ arty, GBUs
- Transition to a conventional op from COIN
- We were on the outside trying to get in.

RAMADI

- Inf Bn C.O.
- Heavily populated. 250K
- My call to avoid use of PGMs.
- Remained a COIN environment
- We were on the inside fighting to stay in.



Actions During Phase II (Stage A)



OBJECTIVE BRYANT

CEMETERY AT N OF TOWN







CONSIDERATIONS

- Al Fajr (Fallujah Nov 04) began with shaping ops in summer / fall 04.
 - PGMs needed to avoid civilian casualties.
- Ended in full scale assault.
 - PGMs needed to avoid friendly casualties.
- Two fights within one fight.
 - One constant thread, the requirement for PGMs.

TWO DISTINCT FIGHTS

FALLUJAH

- RCT X.O.
- Sparsely populated areas, but still significant civilian pop.
- Ability to employ arty, GBUs
- Transition to a conventional op from COIN
- We were on the outside trying to get in.

RAMADI

- Inf Bn C.O.
- Heavily populated. 250K
- My call to avoid use of PGMs.
- Remained a COIN environment
- We were on the inside fighting to stay in.

RAMADI









MAXIT
1

latex surgical
parts de
chirurgie

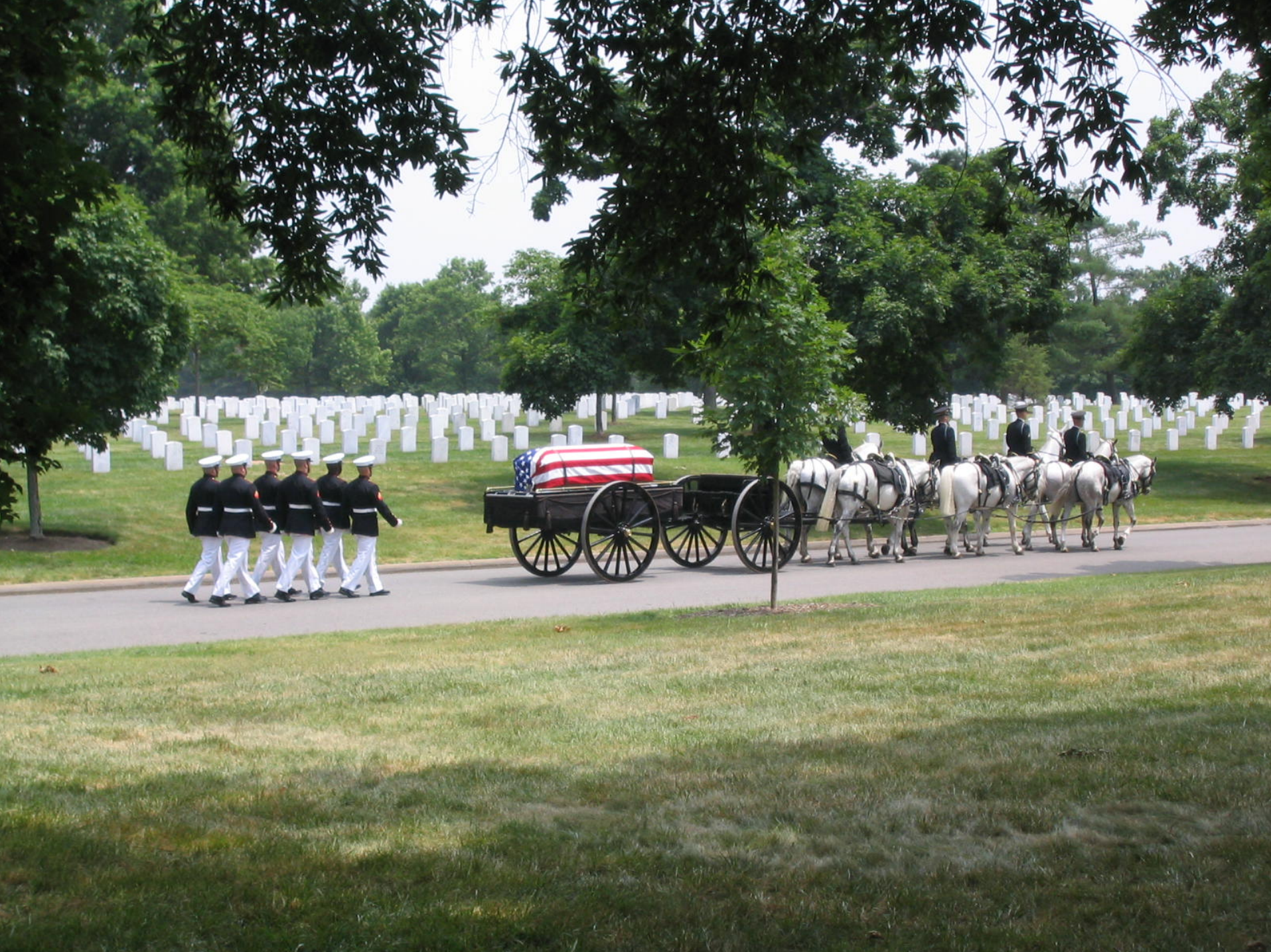














CONSIDERATIONS

- “Precision” usually means something different to the sensor and the shooter.
 - Not a complaint, “I’m just saying”
- Second and third order effects.
 - On all three levels.
- Weaponeering (pounds vs. tgt).
 - There is no “Powell Doctrine” for PGMs.
- Are you seeing what you think you see?
 - The bomb doesn’t care once cleared hot.

WRAP UP

- Just one Marine's perspective
- PGMs have to be considered holistically
 - Design
 - Employment
- What would I like to see in a PGM?
 - Loiter time
 - Laser then scoot
 - Ability to turn off the munition in flight.
 - Ability to employ under “sensory overload”.



Persistent Surveillance Support to Targeting

Precision Strike Association Technology
Symposium

28-30 Oct

Adam Timm

JPSIO

28 Oct 08

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Derived from:

Declassify on:



Agenda

- Joint Persistent Surveillance Integration Office (JPSIO)
- Feature Based GEOINT vs Activity Based GEOINT
- Persistent Surveillance Framework Model
- Objectives of Persistent Surveillance
- Critical technologies Underpinnings
- Ops-Intel Model
- Redefining Targeting



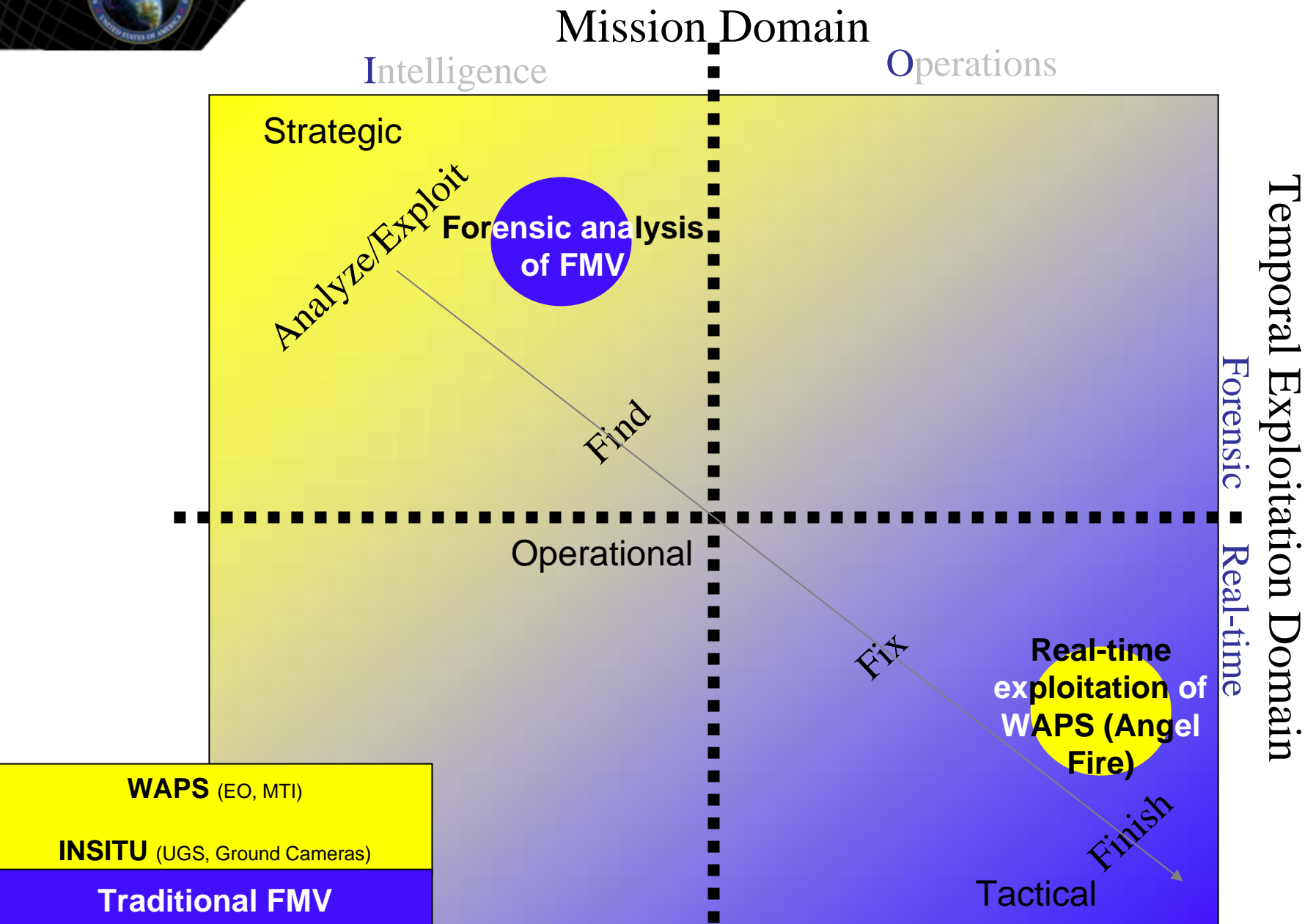
JPSIO Mission and Vision

- Mission: Provide collaborative leadership for enabling persistent GEOINT in the NSG and DOD
- Vision: To be the community focal point for guiding and integrating activities supporting the tasking, processing, exploitation and dissemination of GEOINT data collected in a persistent surveillance environment
 - Key interface with USDI, Joint Staff, Agencies, COCOMs and other leaders in the Persistent Surveillance community
 - Defining the persistent GEOINT TPED CONOPS, operational and technical architecture, standards



Feature Based GEOINT vs. Activity Based GEOINT

- Feature based GEOINT focuses on:
 - Structural components
 - Specific locations
- Activity based GEOINT focuses on:
 - Capturing activities as they occur
 - Developing and unraveling networks
- Persistent Surveillance moves us from being feature focused to being activity focused
- The focus of collection is activity – not the static image





Objectives of Persistent Surveillance

- Capture, characterize, and geolocate activities or transactions
- Identify and geolocate actors or entities conducting activities or transactions
- Identify and geolocate networks between actors and/or entities
- Understand broader interactions between networks
- Develop pattern of life



Critical Technologies

- Data Discovery
 - Identify, track and automatically tag activity
 - Metadata and standards to enable rapid search and retrieval
- Data Integration
 - Common analytic environment that supports integration of multiple sources of intelligence
- Throughput
 - Better/smarter data compression/reduction methods or technologies
 - Improved storage capacities



Ops-Intel

- Persistent surveillance enables the development of intelligence in real time that can further refine or enhance the strategic intelligence picture and also impact current operations while they are on going.
- This breaks the traditional strategic vs. tactical dichotomy.

Currently having a significant impact in Iraq



Redefining Targeting

- As Persistent Surveillance redefines how intelligence supports operations, it is also redefining what is meant by targeting.
- Feature based GEOINT is no longer sufficient for asymmetric warfare with elusive adversaries
 - Must identify, track and target activities rapidly
 - Mission effectiveness is determined by the extent of impact on a network of actors/entities, not how much of a structure is left standing



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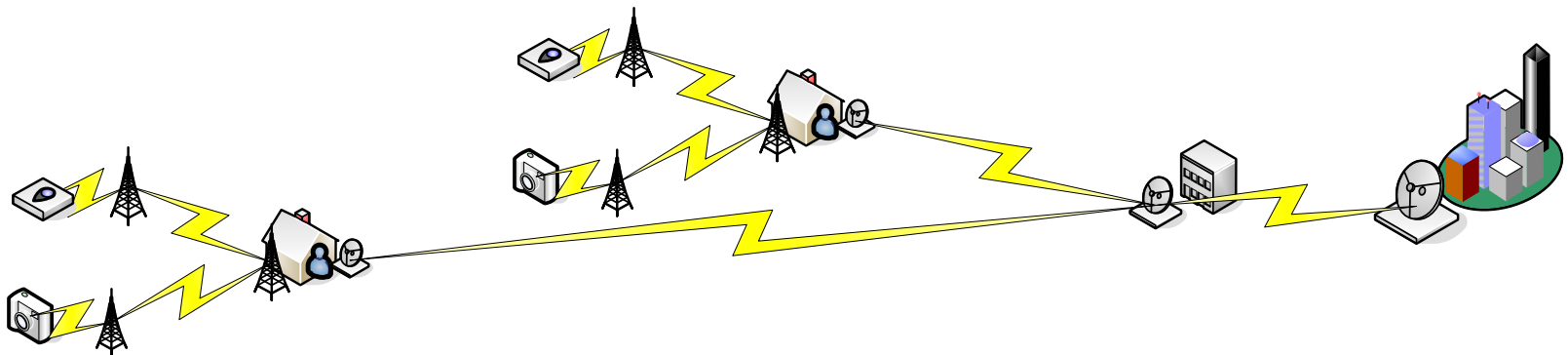
OVERWATCH™
TEXTRON Systems

Enhanced Decision Support with Adaptive Data Fusion

Stanley Young, John Palmer, Seth Greenblatt

Precision Strike Technology Symposium
2008

- Provide semi-automated assistance to decision maker for resource allocation issues
 - What data to send over scarce communications bandwidth
 - Where to focus limited number of analysts
 - Where to focus sensors
 - When to change focus
- Get the right people looking at the right data sooner



- Use all available (archived) sensor and event reports to train a filter to monitor sensor report stream
 - Results of training allow:
 - Reduce amount of real-time, high priority, data sent from sensor to processing node by selecting most relevant subset of data
- Monitor filter performance to determine when something has changed:
 - Sensor relevance/performance
 - Tactics of sensor targets

- Too much raw data to send from collection nodes to processing nodes in real-time over limited bandwidth links
- Too much raw data to process in real-time from collection nodes at processing nodes
- We need to limit what we process and still produce relevant results
- We need to determine when we need to change what we use as input

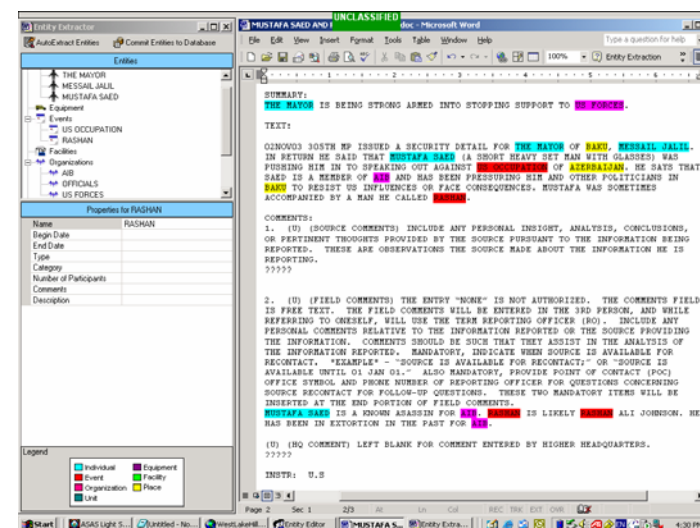
- Observe sensor reports - HUMINT sensors and SIGINT internals
- Use current archive of reports to generate patterns of interest (e.g. correlated with events of interest) by training the system with complete set of archived reports
- Select relevant sensor reports (features) to reduce delay from collection to finished processing - Soft Retasking™
- Train the system using selected sensor reports (features) to identify patterns of interest
- Use trained system to process selected sensor reports
- When system needs to add/learn a new pattern, restart process with training the system with complete set of archived reports

Sensor Reports

- Use attributes from HUMINT and SIGINT internals reports as sensor inputs
- Sources of attributes
 - Individual fields as applicable and available
 - Extracted entities and attributes from reports and transcripts
 - Other projects working on this aspect
- Use generated data for testing:
 - Three Bayesian Belief networks for (Actor, Action, Target) generate data.
 - Based on factors that are plausibly connected to end-state attribute of each.
 - Conditional probability tables that relate these factors to the (Actor, Action, Target) end state selection implicitly represent adversarial tactics and are, in fact unknown.
 - Change in values in tables represents change in tactics.
 - Goal is to recognize change and adjust processing to account for this change.



Raw HUMINT reports



Sample Sensor Reports

-[CASE-1]->~

Report created by PalmerJ at AustinInfo using Netica 1.12
Jun 28, 2007 at 14:10:36.

ActorThreat	FinTies	Ethnicity	Wkly_Contact	Hostiles	Religious_Focus	Criminal_Focus	Religion	Actor_Ge				
Hostile	Direct	Arab	30.6085	Religious	Some	Shia Male Sibling	Normal	46.6888	Yes	Yes		
Neutral	None	Arab	18.57	Religious	None	Sunni Female	None	Zealot	30.0792	Yes	No	
Friendly	None	Kurd	1.48767	Zealot	Some	Shia Female	None	Normal	62.1113	No	No	
Neutral	None	Arab	11.6549	Religious	None	Sunni Female	None	Zealot	29.0059	Yes	No	
Hostile	None	Arab	33.3205	Zealot	Some	Shia Male	Uncle	Zealot	47.3395	No	No	
Neutral	None	Arab	22.2961	None	None	Sunni Female	Village	Normal	6.65112	No	No	
Hostile	ShareBank	Turkmen	31.712	Zealot	Some	Sunni Male	Tribe	Zealot	14.5116	No	No	
Friendly	None	Arab	2.59035	Religious	None	Christian	Male	None	Little	11.0394	No	No
Hostile	ShareAcc	Arab	20.8006	Zealot	Some	Shia Female	Sibling	Zealot	26.2274	No	No	
Hostile	Direct	Arab	21.0734	Zealot	Some	Shia Male	Sibling	Normal	43.9205	No	Yes	
Hostile	ShareAcc	Arab	30.6085	Zealot	Some	Sunni Male	Tribe	Zealot	23.9845	Yes	No	
Hostile	ShareAcc	Arab	34.46	Zealot	Some	Shia Female	Sibling	Normal	33.4881	No	No	
Friendly	None	Arab	0.00136909	Religious	Habitual	Jewish	Male	None	Little	19.9033	No	No
Neutral	None	Arab	0.251959	Religious	Habitual	Shia Male	None	Normal	38.7663	Yes	No	
Neutral	None	Kurd	17.9544	Religious	None	Shia Female	None	Zealot	42.0997	No	No	
Neutral	None	Kurd	17.2083	None	None	Sunni Female	Village	Normal	8.61916	Yes	No	
Friendly	None	Arab	2.73632	Religious	None	Sunni Male	Village	Normal	14.228	No	No	
Friendly	None	Turkmen	9.01729	Religious	None	Shia Female	None	Little	14.4174	No	No	
Neutral	None	Kurd	21.5407	Religious	None	Shia Male	None	Zealot	21.6535	Yes	No	
Hostile	ShareAcc	Arab	25.4288	Religious	Some	Christian	Male	Uncle	Zealot	47.3212	Yes	Yes
Friendly	None	Kurd	7.72351	Religious	None	Sunni Male	Tribe	Normal	52.4941	No	No	
Friendly	ShareBank	Arab	6.78893	Religious	None	Shia Male	Uncle	Little	9.90032	No	No	
Hostile	ShareBank	Arab	33.817	Religious	Some	Shia Male	Uncle	Zealot	29.3863	Yes	No	
Friendly	None	Arab	14.5183	Religious	None	Hindu Male	None	Little	12.2821	No	No	

- Adaptive Resonance Theory (ART) is a neural network architecture developed by Stephen Grossberg and Gail Carpenter
 - Build output categories to classify inputs
 - Carpenter, G.A. and Grossberg, S., 1987, "A massively parallel architecture for a self-organizing neural pattern recognition machine", Computer Vision, Graphics, and Image Processing, 37:54-115
- ARTMAP learns to classify arbitrarily many, arbitrarily ordered vectors into recognition categories based on predictive success
 - Two ART networks
 - One for input observations
 - One for event/result observation
 - With network to link results of output and input networks
 - Carpenter, G.A., Grossberg, S., Reynolds, D.B., 1991, "ARTMAP: Supervised real-time learning and classification of nonstationary data by a self-organizing neural network", Neural Networks, 4:565-588

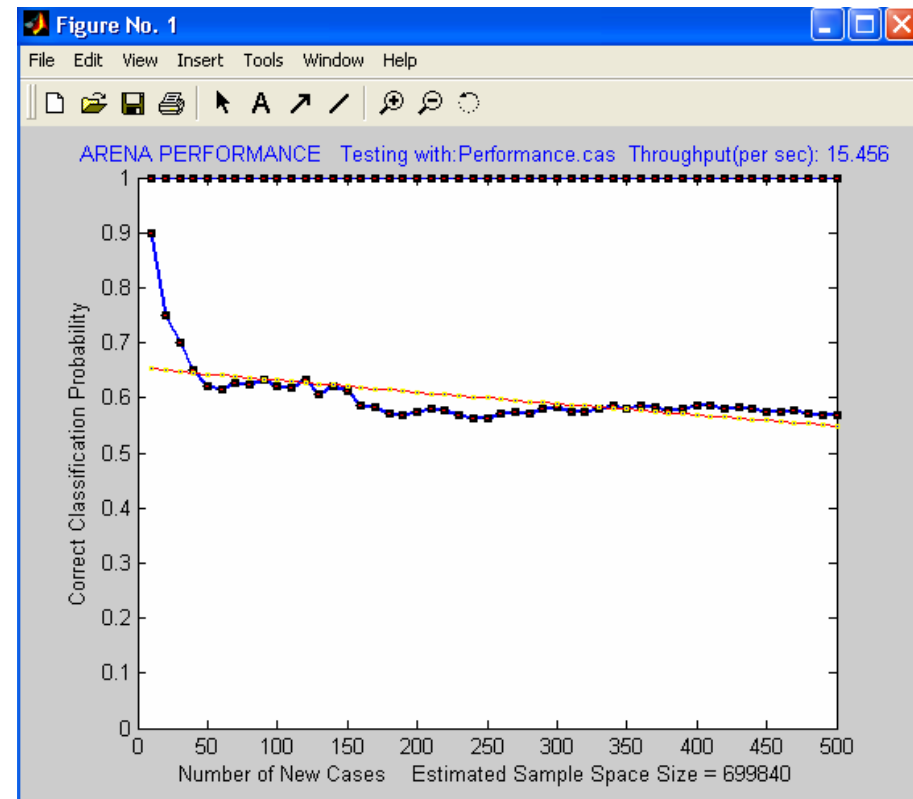
- Use current archive of reports to generate patterns of interest by training ARTMAP with complete set of archived reports
- Input ART network gets sensor reports as input
 - Example: Financial Ties, Ethnicity, Religion, Gender, etc.
- Event/Result ART network gets event or result reports as input
 - Example: Actor-Threat

- ARTMAP supports on-line and off-line learning
 - Off-line takes advantage of statistical nature of selecting different training and validation sets from training data
 - Often trained until correctly classify all training data and weights stabilize
 - Can use “Don’t know” classification as indicator that need to retrain system with potentially new sensor report features
 - On-line allows system to start processing immediately, albeit with a potentially higher error rate
 - Combination possible
 - Start with off-line and update weights as new reports are available
 - Use category creation as indicator of need to retrain

- Soft Retasking™
 - Select relevant sensor reports (features) to reduce delay from collection to finished processing
 - System indicates which features should receive bandwidth and process priority
- Selection process based on weights allocated to feature during training
 - Motivating example from Carpenter, Grossberg, Reynolds categorization of mushrooms into poisonous or non-poisonous
 - 22 observable features
 - Categorization system used only 17 of these features

- In experimental test, trained ARTMAP using selected sensor reports (features) to identify patterns of interest
- Original model using 5 features obtained error rate of 2% with 500 training samples
- Computing statistical correlation of category weights with observed threat identified features that could be excluded
- Reduced model using 3 features obtained error rate of 1.2% with 500 training samples

- Use trained system to process selected sensor reports
 - Potential reduction of communication and processing time to get reduced selection of sensor reports
 - Potential for increased accuracy due to reduction in noise
- Monitor classification error rate and number of input classification categories to determine when to retrain with potential new set of features (sensor reports)



- When system needs to add/learn a new pattern, restart process with training ARTMAP with complete set of archived reports
 - Restart when system needs to add a new classification category
 - Not restart when system only adjusts using current classification categories
- Retraining with complete set of reports allows for identification of need for new features to allow identification of potentially new tactics

- Processing multiple types of SIGINT and event reports
 - Identify patterns in SIGINT data associated with events
 - Identify network activity patterns (social network analysis) associated with events of interest (IED activity)
 - Networks built from SIGINT externals
 - Events culled from HUMINT reports and SIGINT internals
 - Allow watch for new patterns/tactics while monitor current activity
- Multi/Hyper-spectral decoy identification
 - Each layer as sensor report feature
 - Each decoy/threat type as result
 - Allow adapt to and identify new decoy/threat types

- Person identification
 - Usage pattern (e.g. radio, radar) as sensor report
 - Person identification as result
 - Allow adapt to and identify new persons
- Sensor fusion
 - Sensor data and metadata, i.e. data about the sensor, as sensor report
 - Fused picture as result
 - Allow adapt to and identify changes in sensor performance

- Goal:
 - Get the right people looking at the right data sooner
- Motivation:
 - Too much raw data
 - Select what data is relevant
 - Mechanism to identify when “relevant” changes
- Approach:
 - Use filter to identify reduced feature set of interest
 - User reduced filter to monitor reduced sensor stream
 - Monitor filter performance to determine when to adjust feature set

- Enhanced Decision Support with Adaptive Data Fusion
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